Regarding "Endovascular treatment of contained rupture of a superior mesenteric artery aneurysm resulting from neurofibromatosis type I"

We recently reported a case of a patient with two saccular aneurysms in the superior mesenteric artery (SMA), resulting from neurofibromatosis type I. The patient presented with a contained rupture of a SMA aneurysm and was treated with a covered stent.[1,2]

In a routine duplex scan, we saw a late leak in the proximal SMA aneurysm. We did a selective arteriography, and the proximal aneurysm in the SMA was not sealed (Fig 1). We decided to embolize the aneurysm with microcoils,[3,4] and the result was satisfactory (Fig 2).

The angiography after the embolization shows that the proximal aneurysm is excluded from the systemic circulation, and the covered stent is patent (Fig 2). The distal SMA aneurysm was excluded by the covered-stent (in the first operation). The patient went home on the second postoperative day.

Now, both aneurysms are excluded from the systemic circulation.

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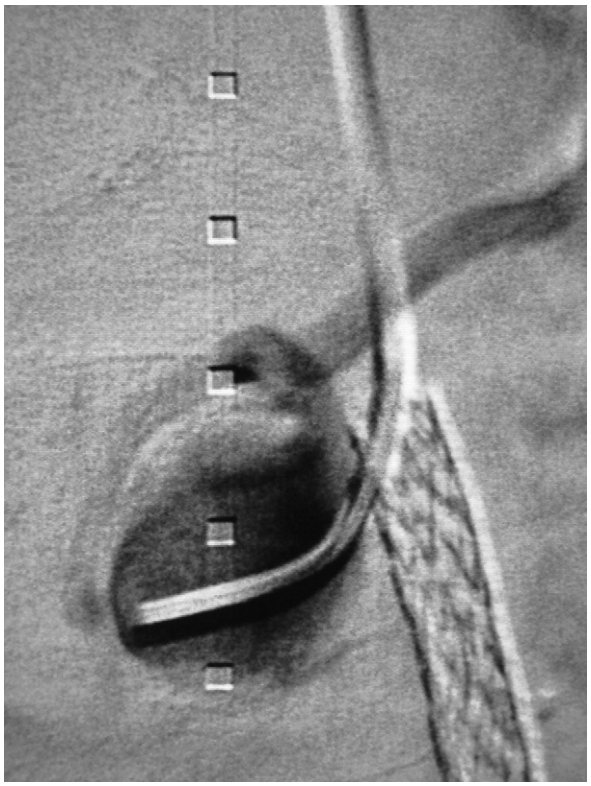

Fig 1. Angiography of the proximal SMA aneurysm showing the leak.

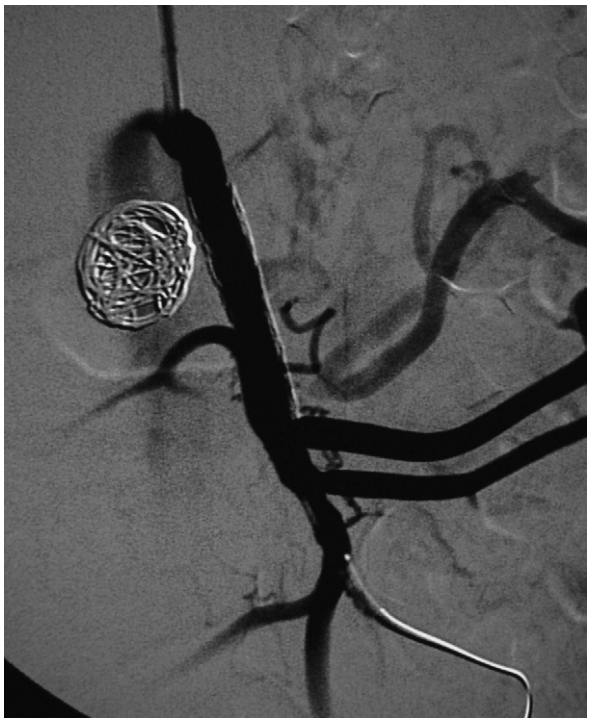

Fig 2. Selective angiography of the SMA after the embolization: the aneurysm is excluded from the systemic circulation, and the covered stent is patent.

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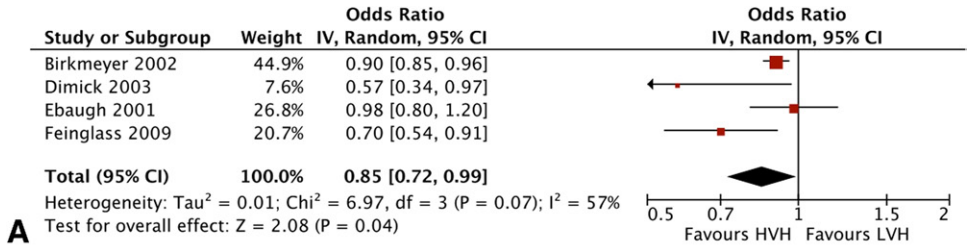
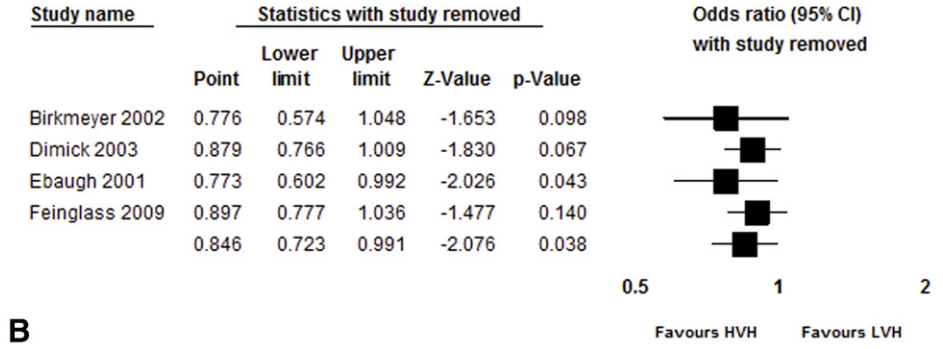
doi:10.1016/j.jvs.2010.04.086

Regarding "Perioperative outcomes and amputation-free survival after lower extremity bypass surgery in California hospitals"

A population-based study by Feinglass et al[1] found that hospital volume was associated with 30-day mortality after lower limb bypass graft surgery. Although a recent meta-analysis[2] is likely to strengthen the results of the study by Feinglass et al,[1] the meta-analysis combined crude (unadjusted for risk) odds ratios (ORs) for death. We performed a meta-analysis of the relationship between hospital volume and perioperative mortality for lower limb arterial surgery, combining not crude but risk-adjusted ORs.



A



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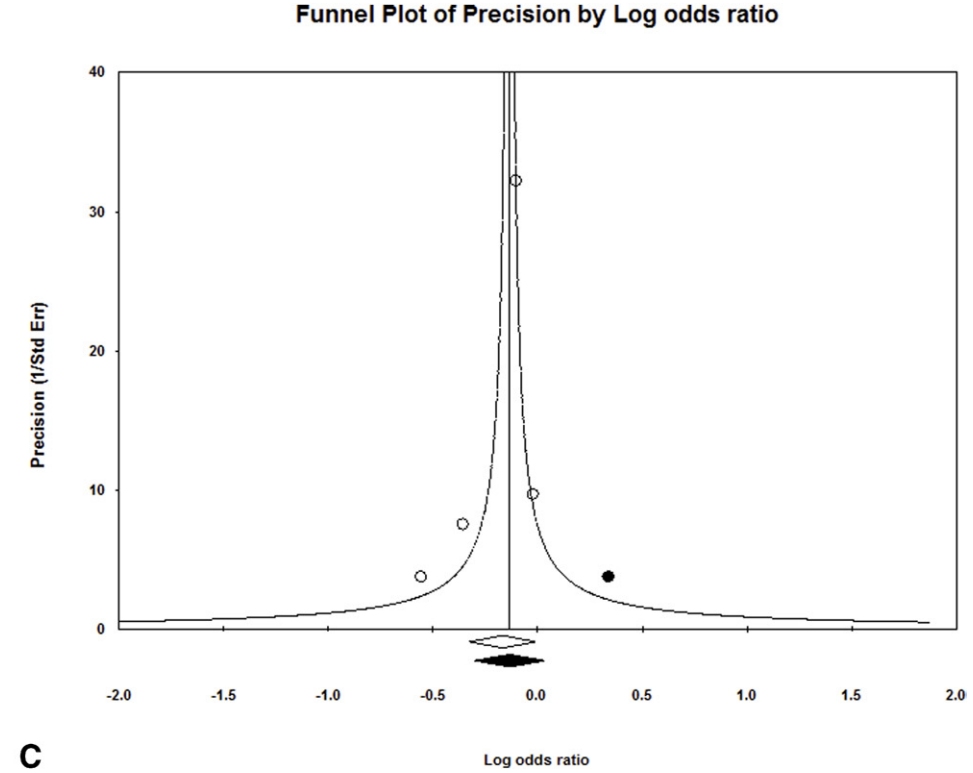

C

Fig. Results are shown by **(A)** forrest plot, **(B)** leave-one-out analysis, and **(C)** trim-and-fill analysis. The *open circles* denote identified studies; *closed circle*, estimated missing study (hypothetic study); *open rhombus*, pooled estimates of only identified studies; *closed rhombus*, pooled estimate of both identified and hypothetic studies. *CI*, Confidence interval; *HVH*, high-volume hospitals; *IV*, inverse variance; *LVH*, low-volume hospitals; *Std Err*, standard error.

Studies considered for inclusion met the following criteria (1) the design was a population-based study, (2) the study population was patients undergoing lower limb vascular surgery, (3) the study addressed the relationship between the annual caseload of lower limb vascular surgery undertaken by a hospital and outcomes, and (4) main outcomes included risk-adjusted ORs and 95% confidence intervals (CIs) for perioperative death.

Our comprehensive search identified four studies.[1,3-5] Birkmeyer et al[2] reported risk-adjusted ORs for operative death in four groups (yearly hospital volume of 22-39, 40-60, 61-94, and >94 compared with <22), and we combined them as a study-specific estimate. At multiple logistic regression, high-volume hospitals (HVH; >25/y) were associated with a decreased risk for in-hospital death in a study by Dimick et al,[3] but HVH (>40/y) were not predictive of lower inpatient mortality in a study by Ebaugh et al.[4] Feinglass et al[1] reported risk-adjusted ORs for 30-day death in three groups (yearly hospital volume of <40, 40-60, and 61-80 compared with >80). We calculated ORs in three groups (yearly hospital volume of 40-60, 61-80, and >80 compared with <40) using standard formulas and then combined them as a study-specific estimate.

Pooled analysis of the four studies demonstrated that HVH were associated with a statistically significant decrease in perioperative mortality (random-effects OR, 0.85; 95% CI, 0.72-0.99; $P = .04$; Fig, *A*). Sensitivity analyses were performed to assess the contribution of each study to the pooled estimate by excluding individual studies one at a time and recalculating the pooled OR estimates for the remaining studies (leave-one-out analysis). Although exclusion of the study by Ebaugh et al[4] from the analysis did not substantively alter the overall result of our analysis, there was no statistical significance without the study by Birkmeyer et al,[2] Dimick et al,[3] or Feinglass et al[1] (Fig, *B*). To assess publication bias, we generated a funnel plot of the logarithm of effect size vs the reciprocal standard error for each study. Because visual inspection of the funnel plot revealed asymmetry, we undertook a sensitivity analysis using the trim-and-fill method[6] (Fig, *C*). The pooled analysis incorporating one hypothetic study showed no statistically significant association between HVH and perioperative mortality (random-effects OR, 0.87; 95% CI, 0.74-1.03).

The results of our analysis suggest that HVH may be associated with a decrease in perioperative mortality, which was not robust, however, because most of the sensitivity analyses demonstrated no statistically significant association.

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doi:10.1016/j.jvs.2010.06.160

Reply

There are several major problems with the conclusions presented by the four-study meta-analysis done by Takagi et al, which concludes that "most of sensitivity analyses demonstrated no statistically significant association" between mortality and hospital volume of lower extremity (LE) bypass graft procedures. This conclusion, based on meta-analytical techniques such as excluding one of the positive studies and simulations that are beyond my expertise, was based on four population-based studies, three of which demonstrate that volume was indeed significantly associated with perioperative mortality. I was an author of the California study, based on 30-day mortality[1] and co-author of the Ebaugh et al study,[2] based on inpatient mortality at northern Illinois hospitals, which was the only study of the four to not find a significant volume-outcome relationship.

It is crucial to note that the Ebaugh et al study was unique in stratifying hospitals by key hospital vascular surgery capability characteristics, such as vascular surgery fellowship programs, general surgery residency programs, accredited blood flow laboratories, open heart surgery facilities, and cardiac intensive care units. Only after stratification for the presence of these hospital characteristics and inclusion of capabilities in the logistic regression model of inpatient mortality did hospital LE bypass surgery volume per se become nonsignificant. Indeed, the main purpose of that study was to elucidate that part of the reason that hospital volume-outcome relationships are so often found is that higher-volume hospitals have greater technical expertise and capabilities. Had capability not been in the model, the Ebaugh et al study would make this four of four positive studies.

A further problem with the meta-analysis by Takagi et al is that the authors restrict their study sample to just four studies that use more sophisticated risk adjustment methods, ignoring altogether the overwhelming evidence from other large population-based studies of LE bypass volume and outcome that use less detailed risk adjustment methods (see for example, Manheim et al 1998[3] and Pearce et al 1999[4]). This assumes that enhanced risk adjustment based on International Classification of Diseases, Ninth Revision (ICD-9) coding somehow has a potentially substantial effect on mitigating LE bypass volume relationships (eg, lower volume institutions admit more complex or severely ill patients). There is absolutely no evidence for this, and from our experience, risk adjustment has little impact on volume outcome relationships in ICD-9 coded vascular surgery data. It seems completely inappropriate to simply dismiss (give no weight at all to) the many other positive studies that clearly demonstrate a strong inverse relationship between volume and LE bypass graft surgery outcomes.

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